

PURPOSE OF THE VALUE ENGINEERING (VE) PROJECT BOOK

The purpose of the IOCP 5-2 is to provide you with a guide and format for conducting and documenting Value Engineering Studies. The steps and techniques that characterize value engineering studies are essential to finding not just a better solution but, the best solution. The essential steps for conducting a VE analysis are outlined in this text. The documentation of a VE study can be expanded or tailored down from the forms provided in this project book depending upon the size and complexity of the study. IOC Forms 5-7-R, 5-7A-R, 5-7B-R, 5-7C-R, 5-7D-R and 70-1 are locally reproducible on 8 1/2" x 11" paper. It is important, however, for VE techniques to be utilized and in some way documented for even relatively simple VE studies. The key aspects of a VE study are function analysis and economic analysis. The VE techniques can be utilized to improve everything from hardware to office procedures. Utilizing the steps outlined in this book will insure your project meets the AMC requirements for a VE study. Submission of required documents will enable savings to be credited towards command goals.

If more information or help is required, feel free to contact your local value engineering office.

The IOC VE Office address is: Headquarters, U.S. Army Industrial Operations Command, ATTN: AMSIO-RMV, Rock Island, Illinois 61299-6000. Our phone number is: DSN 793-3470 or commercial (309)782-3470.

PROJECT BOOK INSTRUCTIONS

A. GENERAL INSTRUCTIONS

1. How do you get started? Once a study area has been identified a memorandum should be written to document the intent to perform a VE study. A memorandum documenting the intent to perform a VE study is required according to AMC Regulation 70-8, AMC Value Engineering Program. The reason VE studies must be identified prior to developing a proposed change is to insure cost saving efforts credited to the VE program are indeed the result of a VE study. It is important for any program to accurately measure its effectiveness in order to seek funding for future efforts and identify any areas which need improvement. The memorandum establishes documentation for your project start so you establish rights to your ideas and efforts. A sample memorandum for documenting the start of a VE effort is included in this package for your convenience. If required, instructions for completing the memorandum are included.

2. The most effective way to conduct a VE study is to choose a crossfunctional VE team. A cross-functional team provides several advantages. One of the major advantages of a diverse team is it is more likely to identify all the disadvantages and advantages of alternative solutions. Few, if any, people are totally knowledgeable about all areas, uses, support, and construction of an item or process. Since various functional groups are represented on a cross-functional team, the likelihood of the teams proposal being adopted is greatly improved. Look at the scope of the study and determine what areas will be potentially affected or provide significant input into the study. Then get these areas involved on the VE team.

3. The VE study approach, or job plan as it is sometimes called, used in this project book is a five phase approach. The phases are: I. Information Phase; II. Speculative Phase; III. Analytical Phase; IV. Planning, Full Development and Testing Phase; and V. Presentation Phase. It is important to follow these phases and document the effort as you go along. It may seem like a lot of paper work, but believe it or not, it can save you time in the long run. The structured and documented approach keeps the VE team on track and progressing toward the goal. Without a structured approach, a study team can jump ahead to designing solutions before they have all of the facts. As a result, a lot of time will be wasted as new information changes the approach of the team. Essentially, the team will waste time as they will have to go "back to the drawing board" many times.

B. VALUE ANALYSIS INSTRUCTIONS

I. The Information Phase

1. The VE study begins. After the area of study is chosen, the first step is the Information Phase. The purpose of the information phase is to find out all you can about the item or process under study. A FUNCTION ANALYSIS IS CRITICAL TO A VE STUDY. You must identify functional/operational requirements which are necessary to fulfill the mission. Analyze the current design to establish functions it performs and determine those that are necessary to fulfill the mission and those that are not. The identification of NECESSARY

functions is essential to conducting a successful VE study. Don't be afraid to challenge the need for functions and requirements. You may need to go to the user community to get reasons why a certain requirement was specified. It is important to remember that changes to equipment, threat, and doctrine can change user needs. In addition, sometimes user needs are inaccurately interpreted by material developers. When a requirement's necessity is doubtful or costly don't be afraid to challenge it. The goal is to provide the necessary functional and mission requirements at the lowest cost. It is also important to identify the cost of the current design and establish a value for the functions it provides through comparisons with items providing like functions. IDENTIFICATION OF ALL COSTS ASSOCIATED WITH THE CURRENT DESIGN IS EXTREMELY IMPORTANT. Don't forget to look at support costs, such as repair parts usage and other maintenance and operation costs. Remember, if you don't know where the cost drivers are you won't know where the areas are with the highest potential for cost savings. Also, investigate current supply status of repair parts. The savings due to increasing a parts reliability may be negated by a very large quantity of repair parts in stock.

2. Complete the worksheets for Information Phase and any other information pertinent to the item or process under study. When completed you should have collected applicable specifications, operational requirements, drawings, identified the necessary functions, challenged those functions not required, identified costs for manufacturing, storing, transporting, demilitarizing, and supporting the item once it is fielded. Make special notes of materials, manufacturing processes, or other requirements that add a great deal of cost to the item under study. The high cost drivers often have the most potential for improvement. Remember, it is important to collect all pertinent information and establish necessary operational and performance requirements prior to developing alternative approaches.

II. The Speculative Phase

1. This is the creative phase. DO NOT START THIS PHASE UNTIL YOU HAVE COMPLETED THE IMPORTANT STEPS IN THE INFORMATION PHASE. Getting into the creative phase before you have established the mission and function requirements is a common mistake. Spend the necessary time in the information phase. It will pay off.
2. After the information phase, it may be obvious what areas are high cost drivers and have the highest potential for improvement. A review of available commercial items and technical developments is a very helpful first step in the speculative phase. A technical review of this type may spark ideas for creative thinking sessions. The speculative phase is designed to provide ideas for improvement to an item or process. Ideas for improvement should not be analyzed or critiqued in this phase. Brainstorming sessions are a good technique to use. The study team should meet as a group and shout out ideas for improvement. Group members should not criticize other team members ideas but are allowed to build upon them. The ideas should be listed on the speculative phase worksheets contained in this project book or recorded in a similar manner. You may wish to put a more detailed description of ideas on separate sheets of paper for future reference. You may want to have more than one session if ideas presented spark interest in investigating technological or commercial opportunities not previously investigated. However, do not rule out ideas or make judgements until the next phase.

Keep basic functions in mind and look for things such as combining parts and process steps, elimination of unnecessary manufacturing finish requirements, utilization of standard or commercially available parts, relaxing of tolerances, and simplification of design to eliminate necessary or duplicative functions. After completion of this phase you should have several possible alternatives listed.

III. The Analytical Phase

1. The purpose of the Analytical Phase is to take the list of alternatives developed in the Speculative Phase and refine them by investigating their advantages and disadvantages. As a result, the alternatives that offer the greatest potential can be identified for continued investigation in the next phase of the study. A gross cost estimate and/or simple list of advantages and disadvantages can be used to eliminate some alternatives. Beware of the temptation to eliminate alternatives too soon. A detailed economic analysis is used to further refine the list of alternatives. Follow the format contained in the project book or a similar format to document your analysis. The end of the Analytical Phase should result in a alternative or group of alternatives that have the highest value potential.

IV. The Planning, Full Development, and Testing Phase

The purpose of the Planning, Full Development, and Testing Phase is to take the most promising alternatives and assess the technical feasibility of each alternative. Does the alternative provide necessary performance? Does the alternative adversely impact safety? Are Reliability, Maintainability, and Availability improved or adversely affected? How are Logistics impacted by the alternative? What tests are required to prove out the alternative and its impacts on performance? What are the results of the testing? At the end of this phase you should be able to make recommendations concerning either dropping or implementing each alternative under study. In addition, you should identify the remaining approvals and special tests that will be required prior to implementation. All tests and approvals that can be completed prior to presentation to the decision maker should be completed and documented in this phase.

V. The Presentation Phase

The purpose of this phase is to present your findings to the decision maker in such a manner as to get approval for your recommendations. This is a very important step and must not be taken lightly. People have a natural tendency to resist change. Concentrate on the major selling points (savings, user satisfaction, etc.). It might be helpful to determine the decision makers background and major areas of interest so that you can highlight your study's advantages in these areas. Utilize any marketing training or techniques that you know. Be sure to stress the process, tests, and alternatives you investigated. Why are you recommending this approach? Why did you reject your other alternatives? Your presentation will be stronger if you demonstrate your recommendations are a result of a thorough and organized study. It is generally a good idea to have your economic analysis validated prior to presentation to the decision maker. The economic analysis should, at a minimum, compare the present method to the proposed method. A sample economic analysis is contained in the back of this book on pages 65 and 67.

C. REPORTING THE SAVINGS

1. Contact your local VE office for instructions and regulations for reporting VE savings. The IOC office utilizes IOC Form 70-1-R as the savings reporting document. Reporting of VE savings and cost avoidance are important to justify funding for future VE program efforts and VE studies. Accurate reporting helps justify funding for incentive awards to successful VE study participants. Only through accurate reporting can VE program managers measure their programs success and assess areas that require improvement. All savings must be verified in order to be reported as VE savings.
2. The following documents or equivalent are required to be submitted to the VE office before the VE savings will be credited toward the AMCCOM VE goal:
 - a. Copy of memorandum identifying VE study (page 6).
 - b. Evidence of functional analysis (page 10).
 - c. IOC Form 70-1-R (pages 64-65).
 - d. Evidence of economic analysis (Sample on pages 66-68).

(Office Symbol) (MARKS No.) (Date)

MEMORANDUM FOR AMSIO-RMV

SUBJECT: Identification of Planned Value Engineering Study

1. A value engineering (VE) study is planned for:

_____.

2. The study will include a functional analysis and be documented as a VE effort for reporting purposes within the VE program. This effort will be conducted:

a. In accordance with the job plan as outlined in the VE Project Book IOCP 5-9.

b. other (specify below):

_____.

3. Point of contact for this effort is:

Typed Name/Title (Originator)	Signature	Date
DSN_____.		

(Signature)
Typed Name
Title

Instructions for Memorandum

1. Fill in your office symbol and date at the top of the memorandum.
2. In the first paragraph of the memorandum provide a brief description of the item, problem, or process to be studied.
3. In paragraph 2 check either a or b. Choose (a) if you plan to utilize the general format and steps outlined in this project book. If you use some other techniques job plan check (b) and specify the plan in the space provided.
Note: A documented function analysis is required for VE studies.
4. Fill in requested point of contact information and sign.

IOCP 5-2

Pages 8 through 63 contain the IOC 5-7-R series forms in MS Powerpoint format (click on link below to open and print hardcopies; cannot fill in electronically, however, next edition of this pam will provide that capability):

[5-7forms.ppt](#)

Pages 64 and 65 contain the IOC Form 70-1-R form in Adobe Acrobat format (click on icon below to open and print hardcopy; cannot fill in electronically, however, next edition of this pam will provide that capability):

[form70-1.pdf](#)

The following is an example of the required format for the submission of the economic analysis that is prepared to support a Value Engineering Proposal (VEP).

VALUE ENGINEERING PROPOSAL ANALYSIS

1. SUBMITTING ORGANIZATION:

Acme Army Ammunition Plant (AAAP)
2. DATE OF SUBMISSION:

30 NOV 91
3. PROJECT TITLE:

Reclamation of Trichloroethane and Cyclohexanone Contaminated with Explosives
4. OBJECTIVE:

The objective of this project is to minimize the cost of disposal and additional purchases of trichloroethane and cyclohexanone.
5. INVESTMENT COST:

a. Acquisition of Solvent Distiller	\$18,500
b. Installation of Solvent Distiller	1,520
c. Modification of Steam Distiller	2,000
d. Installation of Steam Distiller	<u>760</u>
Sub-Total Investment	\$22,780
Discount Factor .954	- <u>1,054</u>
Total Discounted Investment Cost	\$21,726
6. DERIVATION OF INVESTMENT COST:

a. Vendor quote, XYZ Corp., Indianapolis, IN.

b. 40 hours labor at \$38.00/hr (average labor rate including fringes).

c. 20 hours labor at \$38.00/hr, material \$1,240, Vendor quote, ACE Hardware, Fishers, IN.

d. 20 hours labor at \$38.00/hr.
7. ECONOMIC LIFE:

3 years.
8. SAVINGS DURING ECONOMIC LIFE:

Savings/year	\$405,786
Discount Factor	2.372(years 2 through 4)
Discounted Savings	\$405,786 X 2.372 = \$962,524
9. EXPLANATION OF SAVINGS:

DESCRIPTION OF PRESENT PROCEDURE: Explosive contaminated trichloroethane and cyclohexanone are currently disposed of as hazardous wastes at a cost to the government. These solvents are used to clean the remaining explosive residue and asphalt coating left in the bodies of mines, and torpedoes after they have been through a download process. The depleted supply of trichloroethane and cyclohexanone must then be replenished after contamination at an additional cost to the government.

10. DESCRIPTION OF PROPOSED PROCEDURE: A solvent distiller will be purchased and installed to distill the contaminated cyclohexanone and an old steam distiller will be taken out of storage, modified, and installed to distill the contaminated trichloroethane. The proposed procedure will eliminate part of the disposal costs and part of the costs for purchase of additional trichloroethane and cyclohexanone.

AMCCOMP 5-9

SUBMITTING ORGANIZATION: Acme Army Ammunition Plant (AAAP)
DATE OF SUBMISSION: 30 NOV 91

11. DERIVATION OF SAVINGS: Savings were based on two months of actual production from 10 March 90 to 09 May 90. Current estimates project 8 additional months of production scheduled to complete the order.

Total amount of solvent required for the two months from 10 March 90 to 09 May 90:

Trichloroethane	6,960 gallons (127 drums)
Cyclohexanone	935 gallons (17 drums)

Solvent Replacement Cost:

Trichloroethane	\$325 per 55 gallon drum
Cyclohexanone	\$368 per 55 gallon drum

Disposal Cost:

Trichloroethane	\$350 per drum
Cyclohexanone	\$350 per drum

PRESENT METHOD

Solvent Cost:

Trichloroethane	127 drums X \$325	\$14,275
Cyclohexanone	17 drums X \$368	6,256

Disposal Cost:

Trichloroethane	127 drums X \$350	\$44,450
Cyclohexanone	17 drums X \$350	<u>5,950</u>

Total Present Two Month Cost	\$97,931
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PROPOSED METHOD

Under the proposed method, 95 of the 127 drums of Trichloroethane and 7 of the 17 drums of Cyclohexanone will be reclaimed using the distilling process.

Solvent Cost:

Trichloroethane	32 drums X \$325	\$10,400
Cyclohexanone	10 drums X \$368	3,680

Disposal Cost:

Trichloroethane	32 drums X \$350	11,200
Cyclohexanone	10 drums X \$350	<u>3,500</u>

Sub-Total Proposed Cost		\$28,780
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Distillation Cost:

Distillation requires one employee to monitor the distillation process as part of normal duties, therefore, the time spent on distillation is minimal.

5 hours per week X 8 weeks X \$38.00 =	<u>\$ 1,520</u>
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Total Proposed Two Months Cost	\$30,300
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Purchase costs for Trichloroethane and Cyclohexanone were quoted from Chemical Associates, Crawsville, IN.

Disposal cost for Trichloroethane and Cyclohexanone were derived from Chemical Waste Disposal, Danville, IN.

SUBMITTING ORGANIZATION: Acme Army Ammunition Plant (AAAP)

DATE OF SUBMISSION: 30 NOV 91

Present Method Annual Costs	\$ 97,931 X 6 =	\$587,586
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Proposed Method Annual Costs	\$ 30,300 X 6 =	<u>181,800</u>
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Total Annual Savings		\$405,786
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12. SAVINGS/INVESTMENT RATIO: $\$962,524/21,914 = 43.92$

13. VALUE ENGINEERING PROPOSAL:

Old Method Cost	\$587,586
New Method Cost	<u>181,800</u>
Annual Cost Savings	\$405,786
Total Investment	<u>21,726</u>
Total Savings - Year 1	\$384,060
Total Savings - Year 2	\$405,786
Total Savings - Year 3	\$405,786

IOCP 5-2

The proponent of this publication is the HQ IOC Value Engineering Division. Users are invited to send comments to Commander, HQ IOC, ATTN: AMSIO-RMV, Rock Island, IL 61299-6000.

FOR THE COMMANDER:

Official:

//signed//
JESSE A. ESLICK
Deputy Chief of Staff
for Resource Management

DISTRIBUTION:
Special